250 Teaching Techniques

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OBJECTIVES

In keeping with the streamlined trend of modern war industry, 250 *Teaching Techniques* answers the need for a compact presentation of the duties and responsibilities of instructors and a study manual for teachers-in-training. After a comprehensive job analysis of the instructor's duties, the book was written, put to practical use and revised to meet these objectives:

1. To provide a ready reference book which tells the instructor specifically what to do and how to do it.
2. To provide a concentrated but comprehensive content in one cover on the duties and responsibilities of teachers, without long and unnecessary development.
3. To provide a guide for the tradesman-instructor to help him to quickly learn the fine points of teaching.
4. To provide instructions to teachers in simple, understandable language, without use of confusing educational terms.
5. To provide an instructor rating scale for supervisors and a self-rating chart for teachers. The section headings on each technique can be used for these purposes.

6. To provide a textbook for formal teacher-training classes.

The mere reading of this book will not make a good instructor. There is no royal road to success, no short cut to great instructional ability. However, a teacher's success does depend upon the application of the techniques presented in this book. The instructor is urged to think about the principles presented, to discuss the points with others, and of far greater importance — *apply them* to his daily work. His success will be measured upon this application.

R. Randolph Karch
Edward C. Estabrooke

Chicago, Illinois
March, 1943

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250 TEACHING TECHNIQUES

1

QUALITIES OF A GOOD INSTRUCTOR

A. RELATIONS WITH STUDENTS

The success of an instructor depends largely upon his relations with his students. He must not only be skilled in his trade and possess the qualities of a good instructor, but must be able to develop and maintain satisfactory relations with his students. Success depends upon a lot of little things that mean the difference between good and poor relations.

1. Be interested in and try to understand students' problems.

Interest in students is a most important quality of every good instructor. He is one who tries to understand their problems and who willingly helps to solve them. Knowing the names of students is a practical means of showing interest. A student appreciates being called by his own name, and an instructor who capitalizes on this fact helps develop good teacher-student relationships.

2. Answer all questions; side-step no issues.

An instructor inspires confidence in students when he either answers all questions or admits he does

not know. The issue dodger commands little respect from his students or associates. If questions are of importance to the individual, however, answer them individually, and do not take up class time. A good plan is to encourage your students to come to you for information on your subject, and on personal matters as well. Take pains to supply this help.

3. Introduce yourself to the class effectively.

The old slogan "First impressions are lasting" is of considerable significance to instructors. Plan your first meeting with the class with particular care. Introduce yourself and your subject effectively. Make a good first impression — then maintain it throughout the course.

4. Do not let the state of your liver influence your attitude toward your students.

Keep your aches, pains and pet peeves to yourself. The students can't help it if you are not feeling up to par. Be consistently reasonable in your attitude toward your men.

5. Avoid sarcasm and ridicule.

The instructor, skilled at his trade, may have the urge to use ridicule and sarcasm to jar the students into action when they seem awkward or slow to learn. He should remember that he learned the hard way once himself. Uncomplimentary remarks do not stimulate; in fact, they usually build up resentment and retard student learning.

6. Control your temper at all times.

An instructor who "blows off" is likely to say things he doesn't mean, and usually regrets his hasty action later. Self-control is essential in maintaining proper control of a class.

7. Be a good sport.

The student who put a tack on the instructor's chair was immediately sent to the principal by a man who did not "appreciate the point." Students will test an instructor's sportsmanship. They like a good sport who can take a joke and accept it in the spirit in which it is made.

8. Be patient when students ask questions, or can't do the work.

Patience is a virtue – particularly when questions are asked which appear unnecessary or stupid. All students cannot be expected to develop skill or knowledge as quickly as the instructor desires. Patience and understanding are qualities that every good instructor must possess in order to do an effective teaching job.

9. Maintain sufficient reserve.

A good instructor is not "one of the boys." He must command the respect of his students and cannot let down the bars too far. Students look up to the man who maintains the reserve required of his position, particularly during school hours.

10. Refrain from over-familiarity with students.

Over-familiarity with students may lead to partiality toward some at the expense of others. It is advisable to refrain from becoming over-friendly with students.

11. Refrain from embarrassing students.

Never destroy a man's self-respect by embarrassing him before others. Most reprimands should be made in private. One of the greatest mistakes an instructor can make is to humiliate a student before his fellows. Such an incident may create antagonism toward the teacher and a loss of the student's self-confidence which may require a long time to rebuild.

12. Commend good work and attitude of students.

A feeling of satisfaction is essential in the learning process. When students make progress they are stimulated to greater effort and accomplishment. Commend students whenever they deserve it.

13. Ask students for their reaction to your instruction.

One of the surest methods a supervisor can use to determine the effectiveness of an instructor's work is to ask his students. By the same token, the instructor can, if he tries, secure reactions and suggestions from his students that may assist greatly in improving instruction and other phases of the program. Students should be asked to state their reactions frankly. Suggested questions may be

provided to guide their thinking. If they are told to turn in unsigned comments, and if they are assured that any statements made will not affect their mark or record, the instructor will discover some revealing information and undoubtedly a number of constructive suggestions. Some remarks may hurt, but an instructor who wants to do the best possible job will use them to advantage.

14. Judge a student objectively — not on his past record.

A student should not be judged on past grades, performance or reputation. It is the job he does in your shop or class that should be judged as objectively as possible. The good instructor will rate a student's present performance and not be influenced by his past record, whether it is good or bad.

B. PROFESSIONAL

When a man becomes an instructor, he joins the teaching profession and is expected to reflect credit upon himself and his co-workers. The good instructor should have a professional attitude which may be demonstrated in the following ways:

15. Contribute constructive suggestions to improve instruction.

It is the duty of every instructor to make constructive suggestions to improve training. Because of his close association with students, he can observe their reactions and frequently determine solu-

tions to problems which improve instruction. He should pass the ideas along to others in the school program. Supervisors, principals, or other authorities are obligated to welcome and willingly consider all contributions made by instructors.

16. React favorably to constructive criticism.

Two heads are usually better than one, and the instructor who considers well-intended suggestions will benefit. Be open-minded when suggestions are made to improve your work.

17. Keep up; do not neglect professional training.

Professional training of an instructor involves reading, studying, participating in teacher-training classes, and taking advantage of other means to improve his ability as a teacher. The man who keeps up and who takes every opportunity to improve himself professionally prepares himself for the next salary increase and promotion.

18. Keep abreast of your job.

Trade practices change rapidly in all fields. A knowledge of new developments, new tools and equipment, new trends in an instructor's own field as well as in related fields, is essential to keep the course up to date. It is advisable for an instructor to subscribe to professional journals as well as outstanding technical publications in his specialty.

19. Look upon teaching as an opportunity for service, not as "just another job."

The instructor has a man-sized job, that gives many opportunities for service. Consider the men who are selected as instructors for plant training, defense classes, Army, Navy, and other vital training programs. They are not the second-rate mechanics, but the highest skilled and most competent men available. The expert mechanic who is entrusted to teach other men can make a great contribution. As an instructor he is responsible for developing the skill, knowledge, and attitude of every student under his supervision. His opportunities to serve his students and his country are limited only by his own interest, initiative, knowledge and skill.

20. Share your trade knowledge.

Some tradesmen say, "I learned the hard way. Why should I give away my trade secrets?" The good instructor is willing and anxious to teach his students every short-cut, every skill, every bit of trade knowledge possible in the time available. He will also discuss the fine points of his trade with fellow instructors and help them to do a more effective teaching job. It is advisable for those who can express their ideas well in writing to publish occasional articles in professional and technical journals. By doing so an instructor gains prestige, and helps others to do a more effective teaching job.

21. Join and actively support professional organizations in your field.

It is the professional duty of every instructor to support the professional organizations in his field. The American Vocational Association and the branch associations in each state guide the development of vocational education and help safeguard the interests of all persons engaged in the vocational and industrial arts fields. The National Education Association is also worthy of the backing of instructors in every phase of the teaching profession. Teachers should actively support these groups as well as other associations representing the particular technical field of their interests.

22. Live up to the expectations of the public.

The public as well as the profession demands that an instructor conduct himself at all times in a manner befitting his position. He is expected to support community enterprises and be a worthwhile citizen. This applies in a greater degree to instructors than to men engaged in many other occupations, because they deal with human products and must set an example that students are proud to follow.

23. Be able to do the work yourself and do it well.

The instructor who tries to tell students what to do but who can't do the job skillfully himself is incompetent. There is no surer way to lose the

confidence of students than to bluff, or to perform jobs in an unskilled manner. The instructor must master each job himself before attempting to teach it.

24. Attend to school business during school hours.

The good instructor will utilize every minute in class or shop for the benefit of his students. His students and supervisor will appreciate his interest in and application to his job.

C. BE ETHICAL

The teaching profession has what is commonly known as a code of ethics, which involves the morals, character, conduct, and other qualities and actions of each member of the profession.

25. Refrain from spreading rumors.

Rumors are usually dangerous and vicious, and sometimes cause disastrous results to the originator, the carrier, and others concerned. A gossiper or rumor spreader helps to tear down the morale of his organization. The good instructor will stop rumors at their source, and discourage others from disseminating information of any type that may have harmful results.

26. Be loyal to your organization.

A good instructor is constantly faithful to his organization. He is obligated to support it because

the strength of the organization depends upon his actions and attitudes as well as those of other individuals. The teaching profession has no place for an instructor whose loyalty to himself and his group is questionable.

27. Refrain from using profane and obscene language.

An instructor who uses foul language shows that he lacks ability to express himself correctly and resorts to profanity to cover up his shortcomings. The good instructor will set an example for his students and also demand that no profane or obscene language is used by them. The use of foul language is largely a matter of habit which can be easily corrected.

28. Refrain from securing favor for yourself at the expense of your associates.

Few instructors climb to better positions and favor in the eyes of supervisors by "back-biting" their associates. Such actions are usually recognized by associates as a violation of a major premise in the code of ethics.

29. Refrain from making uncomplimentary remarks about others.

The instructor who makes uncomplimentary remarks about others is usually held in suspicion by his fellow workers. He who adversely discusses others to you may abuse you to others. A good rule to follow is, "If it isn't good, don't say it."

30. Stay within communication channels on official matters.

Communication channels are established to increase the efficiency of the organization. An instructor may sometimes feel that the established procedures delay action and should be eliminated in his case. However, for his own protection and for the smooth functioning of his organization, he should conform at all times to the approved practices for carrying on official business.

31. Refrain from making references to politics or religion.

Politics and religion have little direct bearing upon the learning of industrial processes. Some students and instructors are sensitive about their religious and political beliefs and it is well to avoid reference to these controversial topics.

32. Measure your success on present ability, not on past performance.

A skilled craftsman does not always make a good instructor. The good teacher can do the job well himself and can successfully teach it to others. Past performance may have no bearing on present success, as instructors are rated on what they can do *now* — not on what they did years ago.

D. PERSONAL QUALITIES

Good personal qualities are essential for success. Due to the continual personal contact, such qualities are particularly important to the instructor.

33. Be honest.

An instructor has access to valuable tools, equipment, and supplies, and is frequently responsible for collecting fees. All possible precautions should be taken to prevent even the slightest suspicion that an instructor is not strictly honest. Accurate records should be kept of all funds, equipment and supplies.

34. Have good poise.

Students feel uncomfortable in the presence of an instructor who is ill at ease. Self-consciousness, faltering in speech, and poor physical carriage are weaknesses that decrease teaching efficiency. Poise can be developed by constant effort and practice.

35. Be self-reliant.

The good instructor solves his problems with a minimum of assistance from superiors, and does not expect others to perform his duties.

36. Show initiative.

An instructor who has initiative starts things humming without delay. He will try new ideas and develop them without supervision. He will discover weaknesses in his instruction and strive to correct them. He will take the lead in school activities and will thus gain recognition as a leader.

37. Be enthusiastic.

Enthusiasm is contagious. It spreads quickly from instructors to students. The instructor who works

with vigor and enthusiasm sets the pace for his students who catch the spirit and work industriously.

38. Be resourceful.

Few schools are equipped to perfection. Instructors are frequently called upon to handle large classes with a minimum of equipment, tools, and other desirable teaching aids. The resourceful teacher will make every effort to secure additional instructional material. He will request literature, charts, posters, displays, samples, and other aids from manufacturers. He will design and build mock-ups, cut-a-ways, models, and other visual aids. He will make the most efficient use of all instructional material.

39. Be friendly.

The friendly instructor has the greatest opportunity for personal service. Students must often make major personal adjustments. They will bring their problems to the instructor who shows friendly interest in them, and will have greater respect for him and his subject.

40. Be tactful.

An instructor must be able to cope with many difficult situations. He must give opinions and decide the proper course of action without giving offense, and show no favoritism or prejudice.

41. Be sincere.

Students soon discover whether an instructor is sincere in his efforts to teach them, or whether he is primarily interested in his pay check. Without sincerity an instructor cannot hope to arouse and hold the interest and the attention of students.

42. Be courteous.

One must be courteous to teach courtesy. Instructors should demand courtesy from students and should always practice it themselves.

43. Keep physically and mentally fit.

An instructor is of no value while on sick leave. Classes often stand still under the direction of substitute teachers. Teaching is a mental and physical strain, demanding the maintenance of a healthy condition for good performance.

44. Be cooperative.

The efficiency of an educational organization depends largely upon the cooperation of its instructors. The good instructor gets along well with his associates, offers his cooperation willingly, and does more than his share of work.

45. Avoid distracting gestures.

Peculiar mannerisms of any kind are distracting to students, and an instructor should attempt to eliminate any actions that tend to distract from the

lesson. A bit of showmanship will help drive home a point, but the excessive use of gestures may detract rather than add to the effectiveness of the lesson presentation. Distracting habits of speech, such as unnecessary repetition, use of habitual phrases, and mispronunciations are annoying to a class.

46. Talk so students can hear, but do not shout.

The quality of an instructor's voice affects his instruction. A harsh voice or one pitched too high is annoying. Talking in a constant monotone should also be avoided because it kills interest. Words should be correctly and distinctly pronounced so that they can be clearly heard.

47. Be punctual.

When classes are arranged on a tight schedule the instructor should see that they are started promptly and dismissed on time, to prevent annoyance to other instructors and to make full use of all time available.

The good instructor never delays a meeting and wastes the time of those assembled because of his tardiness. Common courtesy demands that appointments be kept promptly.

48. Be accurate on reports and marks.

Reports and marks are worthless unless they are accurate. A double check should be made on all written records in order to eliminate the possibility

of error. Deadlines should be met promptly, because late reports decrease school efficiency and indicate laxity on the part of the instructor.

49. Understand and carry out all rules and regulations.

One of the first duties of every instructor is to become familiar with the policies and aims of his organization, interpret them to his students, and see that they are followed.

50. Keep a breath that is not offensive.

An offensive breath, caused by excessive smoking, bad teeth, stomach trouble, or nervous disorders is a definite handicap to an instructor. His daily work demands close association with students and others who will be adversely affected by a bad breath. The good instructor will check constantly with intimates to make sure that he does not give offense.

51. See that you have no body odor.

There is little excuse for an instructor to have an offensive body odor. Soap and water, when used frequently, are effective in eliminating a factor which will otherwise cause students to shun the presence of their teacher. It is advisable also to have clothes laundered regularly to insure freedom from odor.

E. PERSONAL APPEARANCE

Some tradesman who become instructors overlook the importance of maintaining a good appearance.

Some have become accustomed, after years of work at the trade, to neglect their appearance because it had little or no effect upon their job. As an instructor, however, the situation changes, and appearance takes on new significance. The following is a checklist for keeping a good personal appearance:

a. Keep face clean.
b. Keep hair neatly combed and cut.
c. Be well shaven.
d. Keep clothes clean and neat, and vary clothing as often as possible.
e. Keep shoes shined.
f. Wear proper clothes for work performed.
g. Keep a good posture.
h. Refrain from eating or chewing during class time.
i. Keep hands and finger nails as clean as possible.
j. Keep teeth clean and in good repair.

2

HOW TO CONDUCT SHOP ACTIVITIES

A. INSTRUCTION

Shop activities comprise a major part of trade training. It is, therefore, most important that the instructor conduct all activities in the shop in the most efficient manner. Students learn best by actually *doing* the job.

1. Select projects which conform to objectives.

After the aims of the course have been established, only those projects which contribute to these objectives should be selected.

2. Provide self-assigning projects.

Eliminate the necessity of students asking, "What shall I do next?" by arranging work in such a way that one project automatically follows another. This procedure saves students' time and reduces detail work of the instructor, saving him time that can be better spent in teaching.

3. Provide for cooperative projects.

One of the common course objectives is to provide experiences in working with others. Few people in professions and trades work alone all of the time;

therefore, provision should be made for developing a cooperative attitude on the part of all students. This may be done by providing shop projects on which several members or perhaps the entire group may work.

4. Provide projects for slow, average, and fast students.

Provision for individual differences is fundamental to good teaching. All members of a class never have equal ability, nor do they all work at the same pace. Shop projects that challenge the ability of every student should be assigned.

5. Arrange projects on an increasing scale of difficulty.

Assign first those projects which are easiest to do. This can be determined by checking the time and effort required by the average students to do the job. This procedure will guard against any frustration on the part of students when they try to do difficult jobs first without success.

6. Adhere to approved procedures, but also use your own initiative.

An instructor should see that all jobs are done in accordance with accepted trade or other approved procedures. However, initiative should be used in attempting to improve the methods used in the performance of every job.

7. Have full mastery of the procedures and operations taught.

Be able to do the job yourself, and do it well. If you do not have full mastery, develop it by

practice and investigation. A good teacher must be able to do the job well himself before he attempts to teach it to others.

8. Set a good example.

An instructor's attitude is contagious. If his feeling is at cross purposes with the school or if he does not like the work or the working conditions, this attitude may be transferred to the students, and result in lowered morale.

A teacher's initiative is often copied by students. When the instructor shows drive and enthusiasm, it is probable that many students will follow his example.

Leadership can best be learned from a good leader. Practice the qualities of a good and able guide to develop qualities of leadership in students.

Teach cooperation by being cooperative, not only with the school administration and fellow teachers, but also with students.

9. Develop interest by relating the students' jobs with a final product or a future application.

Students are curious. They want to know exactly why they are asked to do certain things in the shop. Point out the reasons for the job, and explain how it contributes to the objectives of the course.

10. Guard against the student practicing and developing bad work habits.

Practice does not make perfect – only perfect practice makes for perfection. Skills learned wrong

will have to be unlearned. Watch all procedures carefully, and insist that the accepted standards be followed. Give careful supervision, especially when a new job or operation is presented.

11. Never do the job for the student, but ask questions which lead him to solve his own problem.

Students learn best by doing the job themselves. When a student cannot perform an operation, the instructor may direct his thinking by asking questions that will aid him to solve his problem. He may repeat a part of the demonstration given earlier to clarify the work.

12. When criticizing a project, always explain why it does not meet standards, and how it can be improved.

A student project is seldom found that does not have a few good points. Therefore, to maintain the student's interest and satisfaction, it is best to compliment him upon these points first. Then the project can be constructively criticized, and points brought out which will improve the work. "How do you think it could be improved?" is a good question to ask.

13. Instruct constantly throughout the shop period.

Students do better work when they are constantly supervised. One cannot depend upon demonstrations, shop talks, or instruction sheets to do the entire job of instruction. A competent instructor constantly checks and corrects procedures, quality of work, use

of equipment and tools, and safety practices during the entire shop period.

14. Commend students for outstanding work and effort.

It is not enough merely to tell a student when he is wrong. He should also be commended upon his good work and effort. An occasional pat on the back for deserving students makes for greater interest and increases incentive.

15. Check fatigue of students, and correct it.

Where shop work is hard or monotonous, be watchful for tiring students. Interest will lag and accident hazards will increase in proportion to the fatigue present. Correct fatigue by varying the student activities and the methods of instruction.

16. Concentrate students who have common difficulties for further information and instruction.

The progress of the entire class should not be retarded because a few students have serious learning difficulties. After the majority of students have been assigned to their projects, the slow learners can be given further instruction as a separate group.

17. Use instructional aids to supplement shop equipment.

Sufficient equipment is seldom found in any school shop to meet all objectives. Explanations can often be made of equipment not available through the use of pictures, charts, films, and other instructional aids. Take care not to use visual aids when the original object can be used more effectively.

18. Instill competitive spirit by posting work and accomplishment charts.

Select good work and display it as an example for less skillful and slower students. It is advantageous to post the amount and quality of work done by all members of the class so that the students themselves can make comparisons on their own work. Capitalize on the inborn competitive spirit of your students.

19. Stress safety precautions.

Insist that all safety precautions taught are followed to the letter. Practice safety rules yourself. Students cannot be expected to take the time to observe rules if the instructor does not heed them.

Stress the hazards involved in the use of all machines and tools, and discuss the common causes of accidents with the students. Point out that good housekeeping reduces accidents. Where occupational health hazards appear, see that all students are aware of their prevention.

Explain what should be done when accidents occur: whom to call, and the location of the first aid kit.

20. Limit the size of the class according to equipment and number of instructors.

Although this is usually an administrative problem, it is advantageous for the instructor to give his views on the matter so that he will not easily fall into the farce of trying to teach groups which

are too large for the equipment provided, or more students than one teacher can properly handle.

21. Have a list of references for all phases of shop work available for students.

Deeply interested students often ask for direction leading to further information on the work. See that such material is available at all times.

B. SHOP MANAGEMENT

22. Keep tools and materials accessible and orderly.

Establish and maintain a system for checking tools in and out of the toolroom or stockroom so losses will be kept at a minimum. Either a check or requisition system can be used, but in either case, provision must be made for determining where any piece of equipment or tool is at any time.

In the check system, a tab or metal check with the student's number is placed on the rack when a tool is removed. Requisitions are used in the same way, and destroyed when the tool is returned.

23. Keep tools and equipment in good condition.

Any machine which is out of commission is not doing its part in the instructional job. All tools and equipment should be kept in good order and repair. Repairs must be made immediately, and not put off for some "slack" time which may never come.

Routine checks should be made for broken parts and parts out of adjustment. Oiling and greasing of

equipment should be a matter of routine and be checked at specified times. Motors should be inspected to prevent breakdowns. Prevention is better than repair.

24. Have a definite program for maintaining a clean, orderly shop.

Assign persons for specific duties to maintain good housekeeping. Everybody's job is nobody's job. Set the time for clean-up periods. Check the work to see that it is done correctly and on time.

25. Use a shop personnel organization.

A shop organization can be set up which not only gives students an opportunity for assuming responsibility but also relieves the instructor of considerable detail work. A typical student personnel organization, consisting of a shop superintendent, foreman, safety inspector, shop clerk, and stock or toolroom man has been used with success by many instructors. Specific duties are assigned for each job, and students are selected on the basis of their ability.

26. Prevent waste of materials.

It is the instructor's responsibility either to delegate the job or to see personally that waste of materials does not occur in the shop.

27. Provide storage for unfinished projects.

A safe place must be provided for storing all partially-completed projects. This place should be secure from tampering, damage, and theft.

28. Make and enforce necessary rules and regulations.

Make only those rules which are vitally necessary. Rules which suggest means by which students can slight their work should never be included; for example: "Do not throw the rivets out of the window." This rule will in effect suggest that the easiest way out for the student is to throw them away. It would be better to state: "Sort rivets and place them in the proper containers."

Whatever rules are made, insist that they be obeyed at all times by all students. Play no favorites, and abide by the rules yourself. Minimize rules as much as possible, and when rules are recalled, remove them from the list. If this is not done, students do not know which rules apply, and may disregard all rules.

If a rule requires that goggles be used when grinding, for example, and the goggles are not provided, then laxity is definitely encouraged.

Take time during an orientation period to explain all rules, and why they are necessary. Students may believe that the rules are unimportant and only a whim on the part of the instructor unless the reasons for them are carefully explained. Don't make rules just to make rules – always have a good reason.

29. See that light is adequate.

Students must be able to see to do good work. Be sure that machines and working places have sufficient light. If you suspect a lack of light, get a light

meter (usually available from your local electric firm) and check it. For general work, at least 20 foot-candles are needed; for fine instrument reading, at least 75 foot-candles are necessary. If light is inadequate by this test, strong recommendations should be made to higher authority to correct the fault.

30. See that ventilation and temperature are best.

Ventilation is not always easily controlled, but care should be taken to see that all is done to insure satisfactory working conditions. Temperature can often be controlled by opening and closing the windows. Although this sounds rather simple to include in a list of instructional hints, it is true that many teachers pay little attention to this procedure. Temperatures change so gradually that many are not aware that a change has occurred. When this happens, the students may become sleepy. Check the thermometer occasionally and observe the actions of your students.

31. Requisition equipment and supplies.

Request the purchase of only that equipment and material which can be justified. A perpetual inventory can act as a reminder. One should not run out of an item before he reorders. Continual rush orders show that an instructor is not on the job.

32. See that students work during the entire period.

Eliminate any idle time on the part of students. Provide enough work so that no student, however

fast, can finish his job and have nothing more to do. Self-assigning projects will help to eliminate this difficulty. Shop time is valuable – there is usually not enough. None should be wasted.

33. Lay out the shop efficiently.

Arrange the physical equipment of the shop with these things in mind: safety, adequacy of light, grouping of like equipment and machines, production flow, and availability to students and the instructor. When laying out a new shop or rearranging an old one, a good procedure is to make cardboard cut-outs to scale, and place them on a drawing or blueprint of the space to be used. In this way much time can be saved, for when the correct plan is agreed upon, useless moving of machines is eliminated.

C. RECORD KEEPING

34. Know the characteristics of good records.

Forms should be simple, easily interpreted, and readily available. Late developments in the field of record keeping include the use of the visible type, which enables one to quickly find any data.

Records should be adequate; they should give all information needed.

Legibility is the keynote of good records. Sufficient space should be allowed so that writing is easily read.

Records should perform the jobs that they are

intended to do, and only those records should be kept that are necessary.

35. Use personnel records of students.

A good instructor will refer to the personnel records of his students so that he will know their backgrounds of experience and interests.

36. Keep significant records.

The instructor should keep only those records which contribute to the efficiency of activities in his shop. Records frequently required in shop include: tool kits, lockers, machines, workbooks, accidents, production, attendance, passes, tardiness, and reference material.

37. Keep a permanent inventory of tools, equipment, and supplies.

An individual card should be made out for each type of tool and machine. Forms should give the type and kind, manufacturer, date purchased, serial number, cost, and repairs with date made. Permanent inventory of supplies provides a check on the amount used, which eliminates running out of materials by providing an automatic reminder for reordering.

38. Keep progress records of students.

Before the effectiveness of teaching can be measured, it is necessary to know and have a record of the accomplishment of each student. Things learned and jobs completed should be carefully recorded for daily use and for future reference.

39. Minimize record keeping during shop time.

Record systems should be so designed that they necessitate a minimum of time taken from teaching. Instructors should teach during the shop period — not keep records.

40. Submit records on time.

When the administration of a school requires certain records, they are needed for compilations which have deadlines. Do your part so that the whole job can be done quickly and easily. Keep duplicates of memoranda and important reports in order to prove that they were submitted and to have a record for your files.

3

HOW TO PLAN AND PRESENT A LESSON

A large measure of an instructor's success depends upon his ability to effectively plan and present his subject. As a tradesman he was concerned primarily with doing the job himself, but as an instructor his primary duty is to teach others the knowledge and skill that he possesses. The importance of planning each lesson cannot be over-emphasized. No instructor can go to shop or class unprepared and *adequately* teach. Preparation is absolutely necessary. He must know exactly *what* he will teach and *how* he will teach it. The lesson plan should be organized on paper and used as a guide whenever he presents a lesson.

A. PLANNING THE LESSON

1. Select subject matter to conform to objectives of the course.

All things taught should conform to the course objectives. Subject matter should be selected which contributes to the knowledge or skill that students are expected to acquire.

2. Determine the specific objectives of the lesson.

The objectives or aim of each lesson should be clear-cut and specifically stated.

3. Arrange subject matter in order of learning difficulty.

Subject matter should be arranged so that the students can learn, step by step, from the simple fundamentals to the more difficult phases of the work. An instructor should present the easier teaching points at the beginning of the lesson to develop students' confidence in their ability to learn. More difficult phases of the lesson should be introduced gradually, to prevent any feeling of frustration on the part of the students.

4. Have more than enough material for the time available.

A particularly bright class may learn the presented subject-matter quickly, and the instructor who plans only a minimum of material may find himself in an embarrassing position if he has to fake his presentation or mark time until the period ends.

5. Select teaching methods to be used.

After the subject matter has been selected and arranged, the next step is to determine the best teaching methods. Some methods are more effective than others, depending upon the type of lesson. A combination of methods is usually more desirable than the use of any particular one. Vary the method of presentation and devices which involve the

greatest possible use of the students' senses. Demonstrations and the use of visual aids utilize the sense of sight. Explanations, discussions, and the question-and-answer method involve the sense of hearing. The performance of manipulative work, and the use of samples and other objects utilize the sense of touch. Teaching methods involving the sense of taste and of smell can also be used successfully in some cases.

6. Select all instructional devices to be used.

Some of the commonly used instructional devices are:

a. tools
b. equipment
c. supplies
d. charts
e. diagrams
f. blueprints
g. objects
h. models
i. projects
j. mock-ups
k. blackboards
l. procedure boards
m. pictures
n. posters
o. student notebooks
p. motion pictures
q. film strips
r. film slides
s. opaque projector

These aids and others may be used to increase the effectiveness of the lesson presentation. It is the teacher's responsibility to make, buy, or to recommend the purchase or development of such aids.

7. Devise means for securing student participation.

All learning requires activity – mental, physical, or both. An instructor should provide for as much

active student participation as possible. Methods for encouraging participation include:

a. Asking questions
b. Encouraging students to ask questions
c. Stimulating discussion
d. Using the blackboard
e. Having students help in demonstrations, and using visual aids

Most of the students' time in the shop should be spent doing the job. Students learn best when they make use of the hand and eye as well as the mind.

8. Plan means for arousing interest in the lesson.

The good instructor not only prepares his own lesson but also prepares his students to receive it. When students do not learn, the reason is usually that they are not sufficiently interested, not because they lack ability. Therefore, interest should be aroused by explaining the need and importance of the lesson, how the lesson can be applied, forming connections with past and future lessons, telling personal experiences and asking students for their experiences as they apply to the lesson. Too many instructors are so interested in driving home the technical points that they neglect the interest factor which is most essential to learning.

9. Select references for further study.

A list of references should be included in every lesson plan and may be given to students to study.

An instructor should always be prepared to recommend references to students who want to study further.

10. Provide for orientation at the first meeting of the class.

A lesson plan for the first meeting in the course should provide for the orientation of the students to arouse interest and develop an understanding of the school and its functions. Orientation should include:

a. An overview of the course; its aims and objectives
b. A brief description of the class and shop work
c. The importance of the work
d. An explanation of rules and regulations
e. The school schedule
f. The marking system
g. Assignment of work stations

11. Make provision for explaining new words and terms.

New words and terms should be explained when used for the first time. No instructor should assume that any terms are understood by all. It is advisable to include a list of technical terms, with definitions, in each lesson plan. Test during the presentation to make sure that all students understand them clearly.

12. Select main points for summarizing.

A summary should be made at the close of every lesson. The important points of the lesson are stressed

in a brief review to help the students organize the information in their minds and notebooks. Summaries make for clearer understanding and greater retention.

13. Make provision for testing.

Both during and after a class or shop lesson the instructor should always determine if the students have learned it. Testing may be done by asking questions, giving written tests, and checking performance on manipulative work. (See Chapter 7, "How to Make and Use Tests.")

14. Determine specific assignments.

Any assignments should be included in the lesson plan. An instructor must make sure that all assignments are specific, and that the students clearly understand exactly what they are expected to do.

B. WRITE THE LESSON PLAN

15. Select a descriptive title.

The title of the lesson plan should be descriptive of the lesson to be taught. For example, the title of a typical classroom lesson is "The Principle of the Four-Stroke Cycle Engine"; and of a shop lesson, "Cleaning and Adjusting Spark Plugs."

16. State the time to be devoted to the lesson.

Each lesson plan should include a statement of the time to be devoted to it in the general allotment

of time to the course. This information is particularly helpful if the lesson plan is to be used by more than one instructor.

17. Revise and improve the lesson plan whenever possible.

A lesson plan should always be tentative. Whenever improvements in content and methods of presentation are discovered, the lesson plan should be revised and the improvements incorporated.

18. Have lesson plan and all instructional aids ready before presentation.

The lesson plan contains a list of all tools, equipment, materials, and other instructional aids to be used. It is essential for the instructor to refer to his lesson plan before the presentation to make sure that all necessary preparations are made.

C. LESSON PLAN OUTLINE

The following outline is based upon the points previously discussed and is intended to serve as a guide for making an effective lesson plan:

1. Descriptive title
2. Objectives of lesson
3. Time required
4. Instructional aids to be used
5. Teaching methods to be used
6. Means for arousing student interest

7. Means for securing active student participation
8. List of new words and terms, with definitions
9. Subject-matter, in outline or more complete form as required
10. Main points for summary
11. Methods of testing, including list of questions on main points
12. Assignment
13. References

D. PRESENT THE LESSON

19. Follow the lesson plan.

The lesson plan is the instructor's blueprint of the job to be accomplished. A tradesman makes frequent reference to his blueprint to guide him. Likewise, the instructor must refer to a lesson plan to make sure that his presentation is accurate and complete.

20. Use showmanship to arouse and maintain interest.

The instructor who has pep and enthusiasm, who uses an occasional bit of humor and other qualities of the showman during his presentation, has little difficulty in arousing and maintaining the interest of his students.

21. Stand while teaching large groups.

The instructor must be able to see his students and observe their reactions during a lesson presentation. He can do this better when standing, which will also enable the students to see him better.

22. Face the class at all times when talking.

An instructor should talk directly to the class and not off into space or to a blackboard. He should talk clearly enough to be easily heard by everyone.

23. Make sure that the class understands each point before leaving it.

It is difficult for an instructor to tell from the facial expressions of students whether or not they understand. He should test their understanding by asking specific questions. The question, "Do you understand?" is useless, because many students will answer "yes" whether they do or not.

24. Do not retard group progress for a few who do not understand.

When an instructor spends too much time explaining a point to a few slow students, the others in the group lose interest in the lesson. Rather than delay most students' progress, he should meet the slower students after the presentation, or provide some constructive work to keep the brighter students interested and busy while he coaches the slower ones.

25. See that any note-taking is significant — not a chore.

Students should be required to take notes only when they will prove helpful. Student note-taking should involve recording the important points of a lesson as an aid in organizing knowledge, providing study material to be reviewed for tests, or future reference. Taking voluminous notes from dictation

or copying from blackboards wastes student time, when such material can be duplicated. Trade instructors are cautioned not to conduct "art" classes, or provide "busy work" for students.

4

HOW TO CONDUCT DEMONSTRATIONS

The demonstration is one of the most effective teaching methods used in industrial courses. It is possible for students to learn how to perform manipulative operations by reading or by being told how to do them. However, they can learn faster and more effectively when they are also *shown* how the job is done. The technique of making a good demonstration should be mastered by all instructors.

A. BEFORE THE DEMONSTRATION

1. Plan demonstrations of the correct length to do the job.

The demonstration should not be too long, or involve too many operations which may tire the students and prevent them from remembering all operations shown and explained.

Each demonstration should be carefully planned in advance, and the instructor should practice every new demonstration before class to determine the time required to perform it.

A series of short demonstrations is more effective

than one that is too long. Short demonstrations are best so long as the continuity of the operation or process is not broken, or breaking the continuity does not retard the learner.

2. Have materials, tools, and other required items at hand and properly arranged.

If an instructor has to run to the toolroom or send a student for an item, the demonstration is likely to "flop." All equipment, tools, materials, and other items required must be available and properly arranged before the demonstration is started.

3. Explain objectives of the demonstration and develop interest.

The good instructor will explain why a demonstration is important. Students should know how the operation applies to their work, and the importance of being able to do it properly. He will describe the specific objectives of the demonstration and prepare the students so they are eager and ready to learn.

4. Tell students the important points to look for in the demonstration.

It is advisable to briefly preview the highlights of the demonstration, so the students will have an idea of what is coming and what to look for.

B. DURING THE DEMONSTRATION

5. Explain new terms and parts.

There is a tendency for one who is well acquainted with technical terms and parts used in the demonstra-

tion to take for granted that the students also know them. He should be careful to question students on their understanding of new terms and the functions of new parts, and always assume that one or more students in the group need these explanations.

6. Supplement demonstration with visual aids whenever possible.

Charts, diagrams, pictures, blueprints, cutaways, samples, procedure boards, and other instructional aids frequently help to make a demonstration more clear and interesting.

7. Make sure that students can see and hear clearly.

A most common error in demonstrations is the failure to arrange them so that all students can see and hear clearly. If all other elements in the demonstration are perfect and these factors are overlooked, the instructor is wasting his as well as the students' time. It may be necessary to break large groups into small units and repeat the demonstration for each in order to conduct effective demonstrations.

8. Face and talk to the students.

Students should be so located that the instructor can see the face of each one and talk directly to the group. When students form a complete circle around the instructor there are always some who will be unable to see, hear, or participate.

9. Form connections with previous and future lessons if possible.

Whenever possible, it is advisable for the instructor to explain the relationship of the demonstration to operations previously learned and to work that will be done in the future. Students are more attentive and learn more quickly when they understand these relationships.

10. Perform operations at correct pace for clear understanding.

The hand is quicker than the eye; therefore, the instructor should make sure that the demonstration is performed slowly enough so that each movement will be clearly seen by all students. Each operation should be explained as it is performed.

11. Perform all operations skillfully and in proper sequence.

An effective demonstration must be conducted with skill in techniques and procedures. The instructor has the opportunity not only to illustrate the type and standard of performance required, but to develop the students' confidence in themselves to do the things he demonstrates.

12. Refrain from holding up the progress of the whole group for a few who may not understand.

The demonstration should accomplish the greatest good for the greatest number. Individual differences should not be disregarded, but it wastes time to hold up the progress of most students for the few slow

ones. The demonstration should be completed for the whole group. The slower students may be brought together later for further explanation while the others are individually at work.

13. Ask questions during demonstrations to test understanding.

The instructor should ask questions at frequent intervals to determine whether all points are clearly understood. Some students will not ask questions either because they are shy or because they do not want to seem ignorant before their fellows. The good instructor asks questions to counteract this feeling. The question "Do all of you understand?" is useless, because most students do not wish to show their ignorance, and will invariably answer in the affirmative.

14. Encourage students to ask questions at any time.

In order to develop understanding of all things taught, the instructor must discover those points most difficult to learn. To accomplish this he must encourage students to ask questions whenever they do not understand. They should be made to realize that no questions are foolish if sincerely asked.

15. Stress safety rules and precautions.

The safe and correct ways of performing every operation should be stressed. Skilled workers are a liability to themselves and to their employers when they are not on the job. Personal injuries and

damage to tools and equipment are expensive, and all steps should be taken to prevent accidents. Accidents are invariably caused, they do not "just happen."

16. Select students to aid with demonstrations when feasible.

After the instructor has performed the demonstration it is sometimes advisable for him to call upon a student to repeat the operations taught. This procedure helps test understanding and arouses the interest of other members of the group. They will carefully watch every move made by one of their fellows, and will often become more absorbed in finding his errors than they were in the instructor's performance in the demonstration.

C. AFTER THE DEMONSTRATION

17. Summarize key points of the demonstration.

A summary or brief review of the high lights of the demonstration will emphasize important points. Questions will determine if the important points are clearly understood.

18. Provide for student application immediately after the demonstration whenever possible.

Students should go to work immediately after the completion of the demonstration while the procedures are clear in their minds and while interest is high. Individual assignments should be made before

the demonstration to permit them to start work without delay.

19. Check the performance of each student after the demonstration.

The good instructor will test the effectiveness of each demonstration by following it immediately with individualized instruction. He will circulate among his students, watch their performance, ask questions to check understanding, and prevent the formation of any wrong work habits by immediate correction. In this way he discovers weaknesses in learning and in his own teaching.

5

HOW TO USE ORAL QUESTIONING AND DISCUSSION

1. Purposes of oral questioning.

The question and answer method is frequently used in teaching class and shop work. The instructor's ability to use this method effectively is one of the prerequisites of good teaching. This technique may be used to advantage for many purposes:

a. To discover interests, abilities, and knowledge already possessed by students

b. To arouse interest and direct the attention of students to the lesson

c. To stimulate discussion and keep it on the subject

d. To review and summarize important points in the lesson

e. To assist students in planning their work and analyzing their problems

f. To test the student's knowledge and to check the effectiveness of the instruction

2. Insist that all students speak so they can be heard.

An instructor should insist that students speak loud enough to be heard by everyone in the class.

Unless everyone can hear clearly, interest lags. Students should be told to "speak up" immediately if inaudible to any person in the class.

3. Use correct grammar.

Every instructor should use correct grammar and strive to improve his command of English so that he may be better understood and also set a proper example for his students.

4. Use simple words.

A good instructor uses common words that can be readily understood. He does not talk over the heads of his students or fail to explain words that may not be clear to them.

5. Keep on the subject; do not wander.

A difficulty often found in the discussion method is the tendency to get off the subject. Often students ask questions and make remarks which lead the discussion to foreign topics. The instructor should actively guide the discussions to keep them on the subject. Other topics undoubtedly are interesting, but may not conform to course objectives.

6. Keep questions in proper relation.

The instructor should ask questions for a definite purpose and according to a definite plan. These should be included in the lesson plan to assure that questions will be asked at the proper time and in proper relation to preceding and following questions.

7. See that questions are pertinent and thought-provoking.

Questions that can be answered "yes" or "no" are of little value. All questions should be pertinent and stimulate thought on the part of the students before they answer. Use "how," "why," and "what" when asking questions.

8. Ask questions which can be clearly understood and interpreted in only one way.

Questions should be stated so that the students clearly understand them and know exactly what is expected in the answer. Do not ask tricky questions that may be interpreted in several ways. The students will usually challenge these questions or provide the wrong response, thus wasting time and making it necessary for the instructor to restate the question.

9. Ask questions — pause; then name a student to answer.

Direct the question to the entire group, pause until the students have had time to collect their thoughts, and then call upon a student to answer. This procedure stimulates all to think, because no one knows who will be asked to supply the answer. If the instructor calls upon an individual first, then asks him the question, the rest of the class may sit idle and not think about the correct answer, because the responsibility for the answer is already known.

10. Repeat questions only for clarification, not for inattention.

Questions should always be restated if they are not clearly understood. Repeating questions for the benefit of inattentive students, however, should not be practiced, as it develops an attitude of indifference on the part of the students.

11. Ask questions that can be answered.

All questions asked should stimulate thinking and discussion, but should not be too difficult for students to answer. If no one can answer the question, the instructor will have to restate it or ask an easier one.

12. Insist on individual responses to questions.

An instructor should explain at the start of the course the approved procedures for students to follow in answering questions. One practice is to advise the class that no hands are to be raised in response to questions, and no answers are to be given until the instructor selects a student to do so.

13. See that questions are never asked in rotation.

Questioning students in rotation according to alphabetical names or seating arrangement reduces the mental participation of the class. This procedure indicates the student who will be called upon to answer the question and encourages inactivity on the part of other students who know they will not be tested until their turn comes.

14. Call on students with reasonable frequence.

Calling on all students with reasonable frequence enables the instructor to test their understanding and assists him to become better acquainted with individuals in the group.

15. Fit questions to individuals if possible.

The good instructor will try to know the members of the class so that he can ask less difficult questions for the slower students and more difficult questions for the brighter ones. This procedure makes the question method more effective.

16. Allow students to answer from their seats.

Some students have difficulty thinking on their feet and are embarrassed when asked to rise and speak before a group. Some will falsely state that they do not know the answer, rather than stand and supply it. Answering on one's feet provides good practice in public speaking and permits the entire class to see the one who speaks. However, the aim of the question and discussion method is to secure reactions from all students, and this can be better accomplished when they are permitted to speak from their seats. This may not apply in military schools.

17. Encourage all students to participate.

The good instructor will encourage his students to ask reasonable questions for clarification at any time. He will give adequate consideration to all questions asked and will never evade a question.

If he is unable to answer a question, he will not hesitate to say, "I don't know; but I shall try to find the answer for you." He will allow a reasonable time for students to think before they answer, and will not permit a few students to monopolize the discussion. He will call on students whose minds are obviously wandering to bring them back on the subject and stimulate their thinking about the lesson. He will not embarrass students with speech impediments.

18. See that clues to answers are not given by facial expression or voice.

If an instructor makes efficient use of the questioning method he will not indicate the answers by gestures or leading words, and the like. Clues reduce student thinking.

19. Keep personal references from the discussion.

All discussions should be kept ethical by refraining from personal and uncomplimentary references. References to personal qualities of students or associates are not included in the lesson plan, and should be avoided.

20. Always reach a conclusion in a discussion.

Careful planning and guiding of the discussion by the instructor is essential to crystallize the points made into definite conclusions. Discussions should never be terminated unless conclusions are reached. The instructor should summarize the high points and assist the students to formulate conclusions.

6

HOW TO USE MOTION PICTURES AND FILM STRIPS

1. Advantages of motion pictures and film strips.

Most students learn easily and quickly through the sense of sight. If students are presented with a ready-made "mental image" it saves them the necessity of building their own from word pictures presented by the instructor. The picture itself is presented faster and is understood more clearly than written or spoken words.

A picture of the real thing is second best to the thing itself. However, a picture which shows inner workings of a machine is better than the original. Phantom views in film strips and animation in motion pictures are therefore often more effective teaching aids than the equipment itself.

The rapid growth and use of educational film is due in part to the reasons presented above. The following suggestions will serve as a guide for the use of these teaching aids.

A. PREPARATION BEFORE CLASS

2. Use films as aids, not as a substitute for the instructor.

The instructor who uses films must prepare his lesson as carefully as any other type of presentation. Films are most effective only when the instructor uses them as an aid in teaching. They are of little value when merely shown as a substitute for his own initiative.

3. Do not use a film when more effective methods can be used.

Films are not a "cure-all" for all instructional ills. Because a film is available does not necessarily mean that it should be used. An instructor should analyze various methods of teaching the lesson and reject films if other methods and devices prove more successful.

4. Do not use instructional film as an entertainment feature.

The instructor must guard against the possibility of students considering a film as an entertainment feature instead of an aid to learning. It is better for an instructor to say, "Today we will base our lesson on a film," than "We are going to *show* a film." The term "showing" is likely to imply that the students may sit passively and watch the film as they do in movie houses. They should be made to understand clearly that any film used in class or shop is for the purpose of helping them to learn. The

responsibility of making the film an instructional aid is the instructor's job.

5. Schedule films at proper place in the course.

Films should be used during a course when they are most effective. For example, a film on "The Principle of the Two and Four-Stroke Cycle Engine" is very helpful when presented at the beginning of a course in engines. If this film were scheduled after the students had worked on engines and had become thoroughly familiar with the principles of engine operation, its value would be wasted to a large degree.

6. Always preview a film before using it in class.

Films should always be previewed by the instructor before they are presented to students. Film titles are often misleading, and frequently the content is unsatisfactory. Only those films which contribute to the course objectives should be selected for use.

7. Make a lesson plan for the film presentation.

A lesson plan should be prepared as a guide for each film presentation as well as for all other types of lessons. The lesson plan should include:

1. Title of lesson
2. Objectives
3. Time required
4. Other methods to be used to supplement the use of the film

5. Instructional aids required
6. Means of securing student interest
7. Means of securing active student participation
8. Explanation of new terms used in film
9. Explanation of important points for students to look for in film
10. Remarks to supplement the film
11. Important points for summary
12. Methods of testing students for understanding
13. Assignments
14. References

8. Provide a study guide for trainees on each film used.

A student study guide for each film is of great value in guaranteeing its use as an instructional aid. The first page of a study guide should contain the title of the film, the objectives of the lesson, an explanation of the importance of the lesson and its application, a brief description of what to look for in the film, and an explanation of new terms to be encountered during the lesson. The pages following should contain a group of test questions to be answered by the students after the film has been shown, a list of questions for discussion, and a list of references on the lesson. If time does not permit the use of a study guide immediately following the film presentation, the instructor can make an assignment for students to complete on their own time and discuss it at the next class session.

9. Arrange for students to see and hear clearly.

The seating arrangement and other physical conditions must permit all students to see the screen and hear the presentation without difficulty.

10. Set up and focus projector.

The instructor should see that the projector is threaded, focused, and tested before the class reports. The image on the screen should be sharp and sufficiently large. Only a qualified operator who is thoroughly acquainted with the projector should be permitted to use it, to insure against delay and damage to the film or projector. The instructor should learn how to operate projectors himself, because another operator may not always be available.

11. Check lighting conditions.

When film strips are used there should be sufficient light in the rear of the room to permit the instructor to see his students, and for them to see him. When motion pictures are used the room should be as dark as possible.

12. Provide for adequate ventilation.

It is advisable for an instructor to check ventilation factors because curtains, shades, closed doors, and other means for darkening the room may cut off the usual supply of fresh air. Every effort should be made to provide for adequate ventilation to enable students to learn best.

13. Have the stage completely set before class.

The good instructor will have his lesson plan, a supply of student study guides, and all other instructional aids at hand ready for use before the lesson begins. He will have the seating properly arranged, the lighting conditions prepared, the projector ready for operation, and all other necessary preparations completed.

B. DURING MOTION PICTURE PRESENTATION

14. Prepare students for the film.

Before a film is shown, the instructor should see that each student has a study guide, should explain the objectives and arouse interest in the lesson, discuss new terms to be used, give a brief explanation of the contents of the film, advise the students to look for certain important points, and caution them that they will be required to answer the questions in the study guide after seeing the film.

15. Run the entire film first without stopping.

It is usually good practice to run the entire film the first time without stopping. This permits an overview of the content and provides an understanding of the relationship of the various operations and processes.

16. Re-run the entire film or parts if further clarification is desirable.

An instructor should re-run the entire film, or

parts of it, if he considers it necessary to clarify or expand on difficult phases of the film. If the projector is equipped with a device for stopping the motion and projecting a certain frame, the instructor may make additional comments, ask questions, and arouse discussion on important points.

17. Supplement silent film with pertinent remarks.

Pertinent remarks may be made by the instructor during the running of a silent motion picture film which may help to clarify it and assist the students to understand points not covered in the captions. Absolutely no remarks should be attempted during a sound motion picture.

18. Stand or sit at rear of room.

It is advisable for the instructor to be at the rear of the room during a motion picture presentation. He can observe the class, is near the projector in case of emergency, and has a better opportunity from this point to forestall the possibility of student "horseplay."

19. Avoid loss of time between reels.

Student interest lags when projection is delayed during a change of reels. The instructor should see that a minimum of delay is caused by reel changes, and that all precautions are taken to eliminate the possibility of delay from mechanical trouble. A short discussion may be conducted between reels.

C. DURING FILM STRIP PRESENTATION

20. Prepare students for the film.

An instructor should adequately prepare his students for the strip film before it is run, following the same procedures as suggested in paragraph 14 of this chapter.

21. Stand in front of the room.

It is important that the instructor stand in front of the room near the screen when film strips are presented. An instructor cannot present a lesson effectively unless he faces and talks directly to the students. He may need to indicate important parts of the image on the screen, give a brief demonstration, use other instructional aids to supplement the film strip, and carry on other activities which require that he stand at the front of the room during the lesson.

22. Read aloud the caption of each frame.

When the instructor reads the caption of each frame, he is able to emphasize certain words or phrases, inject pertinent remarks between lines in the caption, and make sure that all students can hear clearly. This procedure is recommended in preference to the practice of calling on various students to read the captions, who usually cannot read them as well as the instructor.

23. Indicate important parts of the film by using a pointer.

It is advisable to have a black pointer, approximately four feet long, to use in indicating important parts of the image. Without a pointer it is difficult to focus attention, which is essential in film strip presentations.

24. Make comments on frames requiring explanation or clarification.

The good instructor can increase the effectiveness of the strip film by making comments in addition to the film captions. Brief remarks about the particular application of content in the film, an explanation to clarify certain frames, and other comments based upon his own experience can add to the effectiveness of the presentation.

25. Direct questions to students during the presentation.

The frequent use of questions on important points in the film is highly recommended. This procedure encourages students to participate, stimulates their thinking, holds their attention, and helps the instructor to test for understanding.

D. AFTER THE PRESENTATION

26. Test for learning.

An instructor cannot be sure that the students have learned unless he tests them. Therefore, some means of testing should be used after each film presentation.

The student study guide is an excellent device and has proved its effectiveness in testing the students' understanding of the film. If a study guide is not used, oral questioning or a written objective test may be used effectively.

27. Encourage class discussion when time permits.

Class discussion on the important points covered in the presentation helps to secure active student participation, assists the instructor in knowing his students better, and helps maintain the students' interest.

28. Summarize the lesson presented.

It is advisable for an instructor to summarize every lesson by emphasizing the important points and making sure that definite conclusions have been reached.

29. Explain any errors found in the motion picture.

If operations, facts, or processes shown do not conform to established school practices, these differences should be explained in a constructive manner.

30. Supplement the presentation with other visual aids if necessary.

It is frequently possible to clarify the content of the film by using other instructional aids after the film has been presented. Actual parts, cut-a-way models, charts, diagrams, blackboard drawings, and other devices that apply to the subject should be used to supplement the film whenever possible.

7

HOW TO MAKE AND USE TESTS

Contrary to popular belief, the sole purpose of tests is not to assign marks or grades to students. Tests actually teach; they are excellent instructional devices. Test results are an indication of the knowledge students have about a particular subject at a given time.

1. Use tests to correct weaknesses.

Tests are used to find and correct weaknesses in learning on the part of the students, and weaknesses in teaching on the part of the instructor. Tests can show how much of a given subject is known, and point out what needs to be given more attention in the teaching processes. Students should be told if they are failing before they actually fail, so that they can study harder and make the grade.

2. Use tests to provide incentive.

Tests provide students with the urge to study. They know that they will be asked questions, but they do not know what the questions will be. Therefore they study all of the material so that they will

be prepared for any eventuality. In studying for an examination they review past work in classes and organize the material. Thus they learn more because they know they will be tested.

3. Provide means for comparing by testing.

Through the use of tests, instructors can compare the quality and quantity of the subject matter learned by any individual or class. Through these comparisons they can establish standards. A standard is that which is set up and established as a rule for the measurement of quantity, weight, extent, value, or quality. The measurement of an individual's work is thus expressed in terms of comparison.

When we know the planned end result of a course of study, we know the objectives of that course. We find what the journeyman of that field is expected to do, and what he is expected to know. Then, by comparison with this journeyman standard, we can judge the work and learning of the student who aspires to become as efficient as the journeyman. This learning is then expressed in terms of what the journeyman needs to *know,* what he has to *do,* and the *time* it takes him to do it.

4. Use pretests to determine what is known before course is taken.

A pretest can be given to individuals and groups to determine what they know and what they can do in a subject before any teaching is done. Through

the use of pretests and individualized instruction, a student can be taken from where he is found to the point where the objectives of the course indicates he should be. This is the most efficient and most economical way of teaching. No time needs to be spent in teaching things that the student already knows. It saves time and effort of both the learner and the teacher. The pretest determines what he already knows; he is then taught what he needs; a mastery test then shows whether or not he has learned what he needs.

5. Essay tests.

Essay tests are not recommended because they are not objective. Many experiments and studies show that the essay or subjective type of test cannot be uniformly evaluated. Subjective test marking is subject to one's thinking at that particular moment. Little can be said for the subjective test, except for testing written expression. Students generally get less of a square deal through this type of an examination, and the estimate of the effectiveness of learning and teaching is inaccurate when compared with the objective type. For example, the extent of the correct answer to the following essay question would vary greatly with instructors:

> What are the purposes and advantages of sodium-filled valves in aircraft engines?

A. WRITTEN OBJECTIVE TESTS

Objective written tests have certain advantages:

a. A great number of questions can be asked so that the trade or field taught can be quickly and adequately tested.

b. Students' reading and writing ability is minimized, so that ratings are on subject matter learned rather than on language skill.

c. Scoring can be done by almost anyone.

d. Scoring can be done quickly.

e. The answer to any question is either right or wrong – there is no guessing as to the value of any question.

f. The student is not penalized because of his attitude toward the instructor or the school.

6. Primary considerations in making objective tests. One has at least eight choices of types of objective test questions. Applicable to all types explained in this section are general characteristics which should be followed:

a. Questions should be taken from subject matter taught.

b. Questions should be stated clearly and as briefly as possible.

c. Leading words should not be used, as "Control cables are *always* made of stainless steel wire."

d. Avoid double negatives, such as "It is not impossible to run an engine on one magneto."

e. Avoid patterns in answers, as when the first answer is always right in multiple choice questions, or when making alternate statements false in true-false tests.

f. Do not use ambiguous questions, which in some cases are true and in other cases false, as "Pressure-type baffles cool the engine." The statement is false when an airplane is on the ground and true when it is in the air.

g. Eliminate any ridiculous answers in multiple choice items to prevent the solving of the problem by simple deduction, as "Aircraft engines are cooled by: (*a*) Prestone, (*b*) kerosene, (*c*) *Movietone,* (*d*) alcohol."

h. Avoid making answers false by adding the word "not," as "Aircraft engines are *not* cooled by prestone." It would be better to make a positive statement: "Aircraft engines are cooled by alcohol."

i. Use no more than four or five answers in multiple choice questions.

j. Ask questions on all things taught.

k. Make no attempt to write a test having a predetermined number of questions.

l. Test for the practical application of things learned, and not only for memorized material.

7. Test on all things taught.

If tests are teaching devices, then sufficient time should be allowed for testing all items taught. If we

have the time to teach an item, then we must take the time to prove that each item has been taught, to determine the effectiveness of teaching. If an item is not tested, there is no way of proving that it has been learned. The above statements should not be construed to mean that testing should or can be made on all that a student might have gathered from the course. Testing should be done on all things actually taught, according to the objectives of a course. If there are 15 important parts of a machine, for example, and five are taught, then a check should be made to see if the five parts were learned, not the 15 parts, or three parts.

8. Weight questions as to value.

Either weight questions which are more important than others, or break the important point into several more questions phrased in other language. It is quite unlikely, in any test, that all questions should have the same value on the total score. The total points given for each question should be known by the student taking the test.

B. HOW TO WRITE WRITTEN OBJECTIVE TESTS

Some of the commonly used types of objective tests are discussed in this section. A suggested format, including directions for taking this test, and a sample test item are provided for each type.

9. Multiple choice tests.

Multiple choice tests are one of the most valuable of all objective tests. The student reads the statement or question, and then selects the correct answer from a list of several responses following the statement. All responses should appear plausible, and usually only one response should be correct. If there is a possibility of a student selecting more than one correct response, difficulty arises in scoring and the item is unfair. If the correct response can be selected by eliminating obviously incorrect responses, the item is of little value. The positions of the answers must be changed in the various test items to eliminate an answer pattern.

DIRECTIONS: Each of the following statements has several responses. Select the best response and place the letter preceding it opposite the item number on the score sheet.

EXAMPLE: In most of the newer type of aircraft engines, the exhaust valves are hollow and filled with

a. Carbon tetrachloride
b. Metallic sodium
c. Stellite
d. Engine oil
e. Carbon dioxide

(*Answer, b.*)

10. True-false tests.

True-false tests are of the multiple-choice or recognition type limited to the selection of only two items. Statements must be carefully prepared so that

they are definitely true or definitely false. Any statement that can possibly be answered either way is of no value as a test item. Approximately the same number of true and false statements should be used, and care must be taken not to make a pattern of the answers, or to have odd or even questions all false or all true, or vice-versa.

DIRECTIONS: The following statements are either true or false. If you think a statement is true, mark a T opposite the item number on the score sheet. If it is false, mark an F.

EXAMPLE: In an aircraft engine, sodium-filled valves are used to carry heat away from the valve heads. (*Answer,* T.)

True-false tests can provide a test of reasoning on the part of the student when the directions are written as follows:

DIRECTIONS: *A.* If the statement is true, and the reason given is true, mark figure 1 opposite the item number on the score sheet.

EXAMPLE: Sodium-filled valves are used on new type aircraft engines because they carry heat away from the valve heads. (*Answer,* 1.)

DIRECTIONS: *B.* If the statement is true, but the reason given is false, mark figure 2 on the score sheet.

EXAMPLE: Sodium-filled valves are used on aircraft engines because they are cheaper to manufacture than the ordinary type of valve. (*Answer,* 2.)

DIRECTIONS: *C.* If the statement is false, mark figure 3 on the score sheet.

EXAMPLE: Sodium-filled valves are impractical for use in aircraft engines because they heat up excessively in a short time. (*Answer*, 3.)

11. Matching tests.

Matching tests arrange the items in opposite columns and are especially useful to test understanding of relationships. No more than ten items should be used in any one question.

DIRECTIONS: Mark opposite the item number on the score sheet the letter preceding the item in Column II that is most closely associated with the item in Column I.

EXAMPLE:

Column I	*Column II*
1. Metallic sodium	*a.* Cylinder barrel
2. Engine oil	*b.* Landing gear
3. Hydraulic fluid	*c.* Cowling
4. Nitriding	*d.* Exhaust valve
5. Aluminum alloy	*e.* Prop governor

(*Answer: d, e, b, a, c.*)

12. Rearrangement tests.

Rearrangement tests are useful when testing for the learning of correct procedures.

DIRECTIONS: Five steps are listed, but they are not in the correct order. Determine which step should come first. Place the letter preceding it opposite the item number on the score sheet. Indicate the order of the other steps in the same manner.

EXAMPLE: Steps used in replacing sodium-filled valves are:

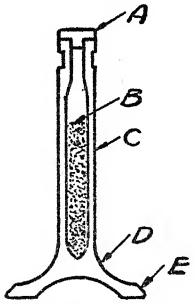
a. Bury or destroy valve
b. Drop valve through cylinder
c. Remove keeper
d. Remove valve washer
e. Remove multiple valve spring

(*Answer: c, d, e, b, a.*)

13. Identification tests.

Identification tests are excellent devices to test students' ability to recognize and identify objects or parts. A whole object may be shown, with parts marked; or the parts themselves may be pictured for identification.

DIRECTIONS: Write the names of the parts on the score sheet opposite the item numbers.



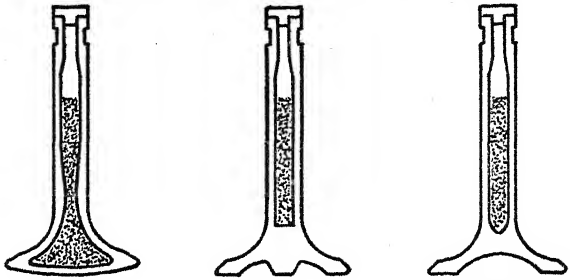
(*Answer:*

A. Hardened tip
B. Sodium chamber
C. Large stem
D. Neck section
E. Face 45°.)

14. Recall tests.

Recall tests require the use of one or more words in the answer. The guessing possibilities are low because no indication of the correct answer is given in the statement. The answer is factual and depends upon the students' ability to recall the correct information from memory.

DIRECTIONS: Write the name of each type of valve shown on the score sheet opposite the item number.



A. B. C.

(*Answer:*

A. Hollow head mushroom type
B. Semi-tulip type
C. Full tulip type.)

DIRECTIONS: Write the word or words that answer the question in the space on the score sheet opposite the item number. The number of blank lines on your test sheet indicate the number of words requested in your answer.

EXAMPLE: What substance carries heat away from exhaust valve heads in the newer type aircraft engine? (*Answer:* Metallic sodium.)

15. Completion tests.

Completion tests are similar to the recall type, requiring a short answer – preferably one word. Statements must be made so that only a particular word or a certain expression can be used to complete the statement correctly.

DIRECTIONS: Complete the following statements by writing the correct word or words in the space provided

on the score sheet. The number of blank lines on your test sheet indicate the number of words required in your answer.

EXAMPLE: In the newer type aircraft engines, heat is carried away from the exhaust valve head by ———— ———— (*Answer:* Metallic sodium.)

16. Enumeration tests.

Enumeration tests are helpful in determining factual knowledge because the statements do not assist the student in recognizing the answer in any way, and therefore call upon his knowledge of the subject to answer correctly.

EXAMPLE: Write the names of the three types of metallic sodium valves used in the newer type of aircraft engines in the spaces provided on the score sheet.

(*Answer:*
1. Full tulip type
2. Semi-tulip type
3. Hollow head mushroom type.)

C. ADMINISTER WRITTEN TESTS EFFICIENTLY

a. Make sure that the directions for taking any written test are so clear to the student that there is not the slightest doubt in his mind about what is wanted. Show how the test is to be taken by examples. To give each person taking the test an even chance, favor no student by giving him additional instructions or hints. Anything spoken before or during the test should be heard by all present.

After the test is started, the instructor should go about the room to see that all directions are carried out. Let the students know if it is a speed test or a power test; that is, if a time limit is placed upon it, or whether or not they have an unlimited time in which to complete the test. In any event, let the students know exactly how long they may work on the test. Time limits on tests often result in merely a testing of the students' perception, or speed of reaction.

b. Use identical scoring sheets for all types of tests. These can be so standardized that they will take either a T or F, for the true-false type; a letter or figure for the multiple choice type; or a word or series of words for completion, recall, and other types of objective tests. It is not economical to use the test sheets when scoring sheets can be provided.

c. Every test must be reviewed with the class after papers are marked and returned to make the test a true teaching device.

d. Students should know as soon as possible the marks earned in any test. They should have something with which to compare their own mark. Therefore, tell the class the high, average, and low scores, and the passing mark of the examination.

e. Refrain from establishing a passing mark *before* a new test is given. A mark of 60% on one test may be a high score, while in another test this mark may designate failure. Establish the passing score *after* consideration of the test results.

17. Determine significance of tests.

The instructor must decide:

a. Whether he is to mark what has been learned in the class, or

b. What the student knows and what he can do at the close of the course.

The two are not identical. The result of a final examination is an indication of what a student has gained in the course only if the teacher checked what he knew at the beginning of the course. The resulting mark is a true grade of progress only when it is compared to the pretest mark. When this is decided, then marking should be considered. (See sec. 4.)

18. Show test results by comparison.

Test results must be shown by comparison. A mark of 100%, or 85%, is significant only when compared to the average mark for the class or with trade standards. On the following table, it is seen that when a student gets 76 questions correct out of a total of 78, his percentage mark is 97 in the converted score. His rank in the class is first.

Rank can be shown for each individual student, as pictured for a typical class of 30 students.

Failure is largely determined arbitrarily by the instructor. The mark designating this failure should be so labeled, unless it is converted to percentage scores when the "passing" mark is set.

COMPARISON OF MARKING SYSTEMS

The following table explains the methods of scoring a test of 78 questions, assuming that each question has equal weight as to importance:

(1)	(2)	(3)	(4)	(5)	(6)
Number of Students	*Questions Correct*	*Students' Rank*	*Percentage Mark*	*Alphabetical Mark*	*3-Grade System*
1	76	1	97	A	A
1	74	2	95	(2 students)	
1	72	3	92		
1	69	4	89		
1	68	5	87	B	
1	67	6	86		
2	66	7	85	(6 students)	
1	65	9	83		
3	64	10	82		
4	63	13	81	C	S
2	62	17	80		
2	60	19	77	(12 students)	
2	59	21	76		
3	58	23	74	D	
1	57	26	73		
1	56	27	72	(7 students)	
1	53	28	68		
1	50	29	64	F	U
1	43	30	55	(3 students)	

Explanation:

A test of 78 questions was given to 30 students.

Column one shows the number of students (30) who received the marks listed from high to low in the second column. Scores in the second column range from 76 to 43. A score can be shown by fractions: 76/78, or 66/78.

Column three lists each student's rank in the class of 30. Two

students each received a mark of 66, therefore both received the rank of seven. The next student who received a mark of 65 therefore earns the rank of ninth.

The fourth column shows the percentage mark, converted from the second column. To convert, divide the questions correct by the total number of questions in the test; for example, 76/78 = 97%.

The fifth column shows the method of assigning alphabetical marks from A to F. F designates failure.

The sixth column shows how marks are assigned in a three-grade system. A is an honor mark, S is satisfactory, and U is unsatisfactory.

Failure marks are set arbitrarily by the instructor in accordance with trade standards.

19. Revise written tests as needed.

When a new test is introduced, it is likely that the students will miss a large percentage of certain questions. When a majority of the students miss a question in a large sampling of learners, this means either that the question is vague or that the point it tests is not adequately taught. Therefore, the question should be revised to improve its clarity, or the teaching method must be improved to give the students a more vivid picture of the points covered.

D. HOW TO MARK OBJECTS MADE OR REPAIRED

All shop or laboratory work is a series of tests on accomplishment. Testing of the student's understanding of what to do and how to do it is continuous. Checking of this work by personal judgment is notoriously inaccurate. The marking or

grading of projects can be made to approach objectivity in several ways:

20. Score projects by quality breakdown.

As an example, the scoring of the Navy splice terminal may be broken down in the following manner, weighting each quality:

Placement of strands	5
Lay of strands	2
Neatness	2
Tightness	1

Similarly one can objectively score mechanical drawing with the following suggested breakdown:

Accuracy	35
Layout	20
Dimensioning	15
Lettering	10
Time	10
Cleanliness	10

In marking students' work in making a tool box base in sheet metal, the quality breakdown might well be:

Diagonal measurement at offset
Placement of rivets
Driving of rivets
Size of gaps at offset corners
Shape at corner bracket
Location of corner angle
Location of bead

21. Rank projects by comparison.

Craftsmanship or quality of work done on a project can be ranked and therefore scored objectively by comparison. In welding, for example, as many samples as feasible can be mounted in order of the quality of workmanship. The project to be marked can be compared to the mounted welds, and scored accordingly.

22. Score by using accuracy gauges.

Where machined projects are to be marked for accuracy, gauges, jigs, fixtures, and other measuring devices may be used to make the grade objective. No-go gauges with predetermined limits may be made for ease and speed of checking, or the longer method of measuring with a micrometer may be used for marking tolerances. Physical strength may also be used to guide the marking on some work; the breaking point may be determined.

23. Score by the time taken to complete projects.

The element of time should not be ignored in the marking procedure. Any project made in one hour, and which passes inspection, should be scored higher than one of equally good characteristics but made in two hours. Time is money to the manufacturer, perhaps the matter of life and death in the work of the armed forces. A plane in the air or a tank in the field an hour earlier may mean the difference between victory and defeat. Time standards should be set up and marked, as well as quality standards.

E. SCORE STUDENT PROCEDURES

Where following correct procedures is an objective of the course, a method of checking and testing must be used to see if the objectives are met. This can be done in two different ways:

24. Score procedures by observation.

Checking and scoring procedures by observation is a subjective method. It is improbable that two instructors will mark a student the same by observation. Yet the direct observance of the man doing the job is a direct method of comparing him to others in the same work. A check list for every procedure will be found almost impossible to use in most cases because too much instructor time is involved.

25. Score procedures by written tests.

The following of correct procedures by the students can be checked and corrected by use of objective written tests. An application of the following tests, previously explained, can be made:

a. Rearrangement or enumeration tests; for example: In replacing sodium-filled valves, the five steps to follow in order are:

(5) Bury or destroy valves
(4) Drop valve through cylinder
(1) Remove keeper
(2) Remove valve washer
(3) Remove multiple valve spring

b. True-false tests; for example:
The last step in replacing sodium-filled valves is to drop the valve through the cylinder. (*Answer,* false.)

26. Teach through scoring procedures.

There are several reasons why a student does not follow the correct procedures as taught:

a. He does not know. The instruction given was inadequate. In this case, teach him again and improve the original teaching techniques.

b. He knows the correct procedures as taught, but he wants to experiment in hopes of finding a better and easier method of doing the work. In this case, he should be asked to practice the procedures as taught, and then bring his new plans to the teacher for further discussion. No one should be deprived of the right to improve a method or procedure. Teachers can learn things from students.

c. He knows the procedure taught, but has had previous experience, and knows in addition the short cuts that come through doing the job. In this case he may be in the wrong class, and practicing things that he already knows. He should be promoted.

d. He knows the procedure taught, but is careless. He just does not "think." He should be warned to use the correct procedure, and "sold" on using correct methods for his own benefit.

F. MARK PERSONAL QUALITIES

A mark on personal qualities should be given in addition to a mark on skill and knowledge. The mark for shop or class work will undoubtedly reflect personal qualities to some degree because a student who possesses such qualities of initiative, self-reliance, and perseverance will usually succeed in earning a high score on his projects and written tests. A personal quality mark exposes the student who is capable of doing good work but, because of a poor attitude or other reasons, does not do his best. His attitude or personal qualities can be compared, just as in other scoring, with the attitude of the other students in the class. The mark on personal qualities should be stated separately from the mark in class and in shop.

27. Rate personal qualities for good teaching.

Certain advantages exist in the rating of students' personal qualifications:

a. It helps an instructor to better understand his students.

b. It points out where students' attitudes are unwholesome, so that corrective measures can be made.

c. It can, when corrective measures are applied, relieve the class or group of annoyances that retard progress.

d. It can, when corrective measures are made,

relieve the teacher of spending too much time with troublemakers, and allow him more time with the other members of the class.

e. Employers or superiors want to know the personal qualities of a student before they hire him.

28. Remember that knowing how and not doing is failure.

Suppose we gave this completion test in a state penitentiary: "Honesty is the ——— ———" It is highly possible that most of the inmates would score 100% on the test question. But the fact remains that they are in jail. They know, but they won't practice what they know.

The person who knows how but will not do a job is a failure.

The attitude of an airplane, or its actions in the air as seen by an observer, can be compared to the attitude of a student in a school. Each, when the attitude is good, clicks along very well. If the attitude of the plane is bad, then something is out of adjustment – something is not working properly. The same principle applies to students. The instructor's job is to get him "on the beam," and rating scales will help him to do this.

29. How to make and use rating scales for attitudes.

An analysis of personal qualities shows that certain characteristics are common in good students. These

RATING CHART FOR ESTIMATE OF STUDENT PERSONAL QUALIFICATIONS

Quality	A	B		C			D	F	
	100%	*90%*	*80%*	*70%*	*60%*	*50%*	*40%*	*30%*	*20%*
	Excellent			*Good*			*Poor*		
Cooperation (Interest) (Leadership)	Always participates in collective action for common good. Observes all rules. Helps others.			Usually participates in collective action for common good. Observes most rules. Helps others when asked.			Never participates in collective action for common good. Ignores rules. Never helps others.		
Promptness (Punctuality)	Always prompt in doing work. Gets to work on time. Does not quit work before time.			Generally prompt doing work. Gets to work on time most of the time. Seldom quits before time.			Usually dilatory in work. Is late most of the time. Usually quits before time.		
Self-reliance (Judgment)	Relies on own efforts to solve problems. Uses discernment.			Does not call for help in problem solving most of the time.			Depends largely upon teacher for help in all work.		
Industry (Drive) (Initiative) (Perseverance)	Habitually diligent. Pays steady attention to job. Steadfast and energetic.			Generally diligent. Works hard most of the time.			Takes time to loaf. Dallies about. Finds excuses for not working.		
Responsibility (Dependability)	Always gets a good job done on time. Is answerable for all assignments.			Is not always accountable to authority for work assigned.			Cannot be depended upon to do his work.		
Honesty (Reliability)	Always tells the truth. Invariably does the honorable thing.			Seldom untruthful.			Lies and cheats most of the time.		
Personal Appearance	Always clean, neatly dressed, well-shaven.			Seldom unclean, sometimes sloppy in dress, often forgets to shave.			Always dirty, usually sloppy in dress, usually unshaven.		

can be listed, and checked in comparable ratings of individuals.

The chart on page 104 suggests what can be done to facilitate checking the personal qualities of students. It must be remembered that such ratings have a very high degree of subjectivity. Great care should be taken to see that injustice is not done to students.

8

HOW TO MAINTAIN GOOD DISCIPLINE

Discipline is one of the prime responsibilities of the instructor. In some schools it is a minor problem; in others it is a major consideration. Poor disciplinary measures often account for the success or failure of a teacher. This section deals with methods for preventing the necessity for disciplinary measures, and suggestions for solving problems when they arise.

1. Understand that correction is the purpose of discipline.

Educationally, discipline is not chastisement. Disciplinary action seldom means that pain is inflicted upon the student for some misdemeanor. Discipline is a systematic training for the improvement of the students' actions and attitudes.

Training in discipline is secondary in importance only to training in skills and knowledge. To know how to do a thing is not enough – one must do the job the way the supervisor wants it done; be able to get along with others while doing it, and carry out his responsibilities on the job.

2. Make all reprimands with justice and tact.

The "state of your liver" should never influence your disciplinary measures. The enormity of the offense may increase with your mental and physical ill-feeling of the moment. Therefore it is wise, when you are feeling unwell or are angry, to refrain from any drastic action until you have had the opportunity to feel better or cool off.

3. Be consistent in disciplinary actions.

Have no pets who can "get away with murder," while others live in fear of making minor errors. Make all corrections impersonal. Refrain from humiliating students – especially before others.

4. Consider the student's mental and physical condition.

If your own actions are influenced by the way you feel, then the same is true of the student who usually does not have the advantage of your age and experience to guide his actions.

5. Seek the actual cause of the student's poor work or poor attitude.

Ask questions that may determine the reasons underlying a man's actions. His difficulty may be due to a misunderstanding, a lack of appreciation, the absence of incentives, or a real or imaginary injustice.

6. Don't be influenced by a student's reputation.

Let a man escape from his past – give him the opportunity to make good. Make no mention of his

trouble in other courses or jobs. Give him a fair chance.

7. Control order through an interest in work.

Not only should the instructor provide enough work for the individual student at all times, but this work must challenge his ability. It cannot take the form of "busy work." Work must have a meaning that is important to the student.

8. Be sure that all students can hear and see clearly.

If students cannot see or hear the presentation of the lessons, they will invariably find other things to occupy their minds. This may take the form of inattention or horseplay.

9. Provide sufficient working materials.

If students have to wait turns at machines, if there are insufficient tools and supplies, or if they are unable to keep busy at all times for any other reason, their idleness may result in disciplinary problems.

10. Stop disorder at its origin.

Stop an argument or horseplay before it develops into worse action — perhaps a fight. Break up immediately any congregating and loafing of students.

11. Be strict with new groups.

Be more strict than usual with new groups of students, some of whom may try to see how far they can go with the new teacher. After the students know

that he means business, and after they understand that they come to shop or class to *learn,* an instructor can be more lenient.

12. Recognize that a student's work is just as important to him as your work is to you.

To belittle the work or interests of a student may discourage him from coming to you for advice and counsel in the future. Show respect for the activities of youth.

13. Handle all disciplinary cases yourself whenever possible.

A good teacher is one who seldom needs to call upon higher authority to maintain discipline in his class. Discipline is usually his responsibility, not the job of supervisors and principals. Report only the major infractions to higher authority.

14. Employ positive procedures.

Give instructions and make corrections positively, not negatively. Say "Do this," avoid saying "Don't do that!" Be willing to explain the reasons for all orders. To say "Do this," may get the job done, but students will carry out orders better when reasons are given. Teach the students how to conform to regulations. Always explain the reasons for any disciplinary action. Make sure that the student understands perfectly just why the action is taken.

15. Make only necessary rules, and rigidly enforce them.

Be able to explain in detail the reasons for all rules. A "No Smoking" sign should not need the word "positively" to convey its meaning. It should mean what it says. See that all rules are necessary, and be sure that each student not only understands them but knows why they are made. The violation of a rule may mean that the student did not understand it, and it may be the instructor's fault that the rule is broken.

a. Rules should not suggest wrong behavior or activity. To say "Do not throw rivets out of the window" may suggest an easy but wrong way out of a problem. It is better to say, "All rivets must be sorted and placed in their proper containers."

16. Avoid assigning school work as punishment.

To punish one with a hard extra job in the place where he should be happy and constructively engaged is an error. To force a student to copy several pages of poetry as punishment for a misdeed will hardly help him to appreciate the value of poetry. To punish him with extra work in a shop may make him lose interest in shop activities.

17. Do not discipline an entire class for the acts of an individual.

A just resentment fills the minds of students who are punished en masse for the acts of one or of a few individuals. This resentment reacts unfavor-

ably upon the teacher and may create additional disciplinary problems. An appeal to the class for aid in solving disciplinary problems is frequently very effective.

18. Avoid arguments with students.

To involve yourself in petty arguments with students lowers your efficiency as an instructor. Give the student his right to speak and defend himself, but do not enter into the "'tis-tain't" type of discussion. It should be unnecessary to reiterate your charges against the student.

19. Avoid using abusive language.

Always respect the rights of students. Do not humiliate or anger them by telling them or intimating that they are "dumb" or lazy. If a student is actually stupid, he probably cannot help it, and it will do little good to remind him of the fact. If he is lazy, tell him how he can do more and better work — that he is not up to the standard of the class. Students like to be called by their names; they appreciate this recognition. They should not be referred to as "Hey, You!" — or worse.

Make no threats. Threats are often difficult or impossible to carry out. Threats not carried out become meaningless in a short time, and lower the students' respect for the instructor.

20. Refrain from becoming too familiar with students.

A "pal" is often one who cannot lead, instruct, or discipline. Familiarity often breeds contempt. The

good teacher is not slapped on the back, wrestled with, or called "Joe." He invites respect by his dignity, but this dignity need not assume the proportions of a "stuffed shirt."

21. Cooperate with others in maintaining discipline.

The maintenance of discipline is not only the individual job of the teacher, but a collective one embracing all of the instructors of a school. Students who are permitted to be disorderly in one class have a difficult time settling down to business in another class where the teacher requires proper order. A good instructor is one who will not hesitate to correct disorder in another class if its instructor is absent for a short time.

22. Make the disciplinary action fit the deed.

It was little good for the hangman to say to the youth as he led him up the scaffold, "This ought to be a good lesson to you, young man!" The youth realized his error, but could do little about it – then. Expulsion of a student from school or from a class is not a corrective measure. The student may *want* to be sent away from classes, and will repeat an offense purposely in order to be dismissed.

Match the corrective action to the misdemeanor. Allow a man the chance to prove that he can do the right thing. Be considerate of inexperience – remember that all men make mistakes. Do not discourage the student to the point where he may abandon his education because of penalties inflicted

for his disregard or misinterpretation of relatively minor rules.

23. See that students do not live in fear.

Harsh disciplinarians whose students live in such fear that they are afraid to speak their minds are not good teachers. Refrain from being a disciplinary tyrant. Try to find the middle ground between laxity and tyranny.

24. Refrain from using "third degree" methods.

The teacher is in error who subjects individual students to inquisitions to discover who is responsible for mischief. Students do not want to "snitch" on others. Therefore they should not be forced into the role of informers. The instructor should solve his disciplinary problems without the benefit of either espionage or the torture chamber.

25. Refuse to get excited over misdeeds.

It is literally fun to a class when the teacher gets excited and tears his hair over their acts. Theater patrons pay admissions to see the same type of comedy based on angry reactions from the "quick temper" to the "slow burn." In short, don't allow students to "get under your skin." If you put on a "show," they may do whatever is necessary for an encore.

9

HOW TO MAKE A COURSE OF STUDY

A course of study is a written plan or outline for directing the thinking, planning, and experience of those who wish to progress in a subject. A course is one of a number of units of study within an organized curriculum. A procedure to follow in building a course of study is contained in this chapter.

1. List objectives of the school.

An instructor should be familiar with the broad objectives of the school before attempting to make his course of study. The school administrators should be able to supply these objectives upon request.

2. List objectives of the department.

It is important for an instructor to know the broad objectives of the department in which he works. These should be determined before the more specific objectives of his own course are developed.

3. Determine the objectives of the course.

The next step in building a course of study is to list the objectives or goals to be reached by the students. These objectives should list what the stu-

dents should be able to do and what they should know upon completion of the course. These objectives should be specifically stated, and should be within reason according to the age and abilities of the student, the time available for the course, and the equipment and other facilities to be used. State only those objectives which are worthy of the time, effort and cost expended. The objectives of the course of study should be approved by the industry or agency for whom the men are being trained.

4. State the time involved.

State the time elements of the course; that is, the length in years, weeks, or days, and the number of hours per day.

5. State the course level.

Include a statement of the type of school: junior, senior, or vocational high school, war training program or other. State the type of course, whether industrial arts, vocational, trade, extension, or other. State also the school grade for which the course is intended.

6. State size of class.

State the maximum number of students which can be accommodated in your shop.

7. List instructional methods and devices.

The various teaching methods and devices to be used in the course should be briefly described.

8. State the scoring methods.

Explain the type of scoring or grading methods to be used; that is, whether alphabetical, numerical, or other. See Chapter 7, "How to Use Tests."

9. Survey all available literature on the subject.

To prevent duplication of effort and to save time, all books, magazines, and other courses of study should be examined to see what has already been done. This investigation will lead to a better understanding of the problem. In some cases, it may be found that other courses of study are applicable in whole or in part.

10. Describe the student personnel organization.

Explain the type of student personnel organization if one is to be used. See Chapter 2, "How to Conduct Shop Activities."

11. List text and reference books.

Where texts and reference books are used, they should be listed in the course of study.

12. List tools and equipment to be used.

List the amount and type of tools and equipment available for instruction in the shop.

13. List all operations to be learned.

Select a series of operations actually done on the job taught, or as closely resembling these jobs as is possible. This list can be made up first by the trades-

man who is writing the course of study, and rechecked in conference with others who also know the work.

Operations which cannot be taught in the school because of lack of equipment should be eliminated at this point until the equipment can be added at some future date.

Listed below are a few typical operations:

a. Drill holes in metal with a hand drill.
b. Cut metal with a cold chisel.
c. Cut threads with stock and die.
d. Coat metal with layout fluid.

14. Select projects to be performed.

Select projects that involve the operations to be taught. Typical project titles are:

Make a Funnel.
Make a Water-tight Riveted Patch.
Make a Center Punch.
Make a Butt Weld.
Clean a Spark Plug.
Remove a Hydromatic Propeller.

15. List the related information to be learned.

Related information is of two types:

a. Technical information required in order to do the job.
b. General information related to the work or allied fields which adds to the students' knowledge. This information may be taught if time permits.

16. Write the lesson plans for teaching the operations and related information.

Based on the analysis presented here, and applying the principles suggested in the chapter "How to Present a Lesson," and "How to Write Instruction Sheets," prepare the lesson material.

17. Try out the course and revise it where necessary.

Additions, subtractions, and changes will probably have to be made on any course of study after it has been tried out. The proof of its worth is not in the written stage, but in actual use. Any course of study should be tentative. Periodic revision will be needed to keep it up to date.

10

HOW TO WRITE INSTRUCTION SHEETS

An instruction sheet is a printed or otherwise duplicated aid to a student in learning facts, applying these facts through making, repairing, or assembling a project, and presenting related or other information. Instruction sheets should not be used as a substitute for the instructor, but as an aid to learning with other instructional methods. The advantages of instruction sheets are proportional to the skill with which they are written, illustrated, reproduced, and used.

1. Advantages of instruction sheets.

a. Good instruction sheets give assurance that the course content is covered. There is little chance that any subject matter or practical application of knowledge will be omitted if the instruction sheets are well-written and used in an intelligent manner.

b. Good instruction sheets provide more uniform instructions than can be given orally. It is almost impossible for a teacher to present a lesson twice in the same manner, but instruction sheets provide information in exactly the same way each time they are used.

c. Good instruction sheets provide practice in

following written instructions which are commonly used in industrial and other fields. It is therefore good practice for students to learn how they are used prior to working on the job.

d. Good instruction sheets permit each student to progress at his own rate. They are helpful in providing for individual differences of slow, average, and fast learners.

e. Good instruction sheets assist the instructor to handle large groups efficiently. When students progress individually, the instructor has more time to assist students who require special attention. The teacher's opportunities for giving individual instruction is increased.

f. Good instruction sheets help students to develop habits of self-reliance. Students are encouraged to solve many of their own problems through the use of instruction sheets, making possible an application of their own initiative and energies.

g. Good instruction sheets provide self-assigning lessons. Students need not wait for the instructor to assign new lessons or projects after they have completed each unit. After one job is completed and checked by the instructor, they can proceed to the next without delay.

h. Good instruction sheets permit individual review by students independently of the class.

i. Good instruction sheets allow students to enter the course at any time without missing important preliminary work.

j. Good instruction sheets eliminate the necessity for students asking the instructor numerous questions. Many questions are answered by the instruction sheet.

2. Disadvantages of instruction sheets.

The use of poorly planned and weakly written instruction sheets may be worse than the methods they are planned to improve. The mere use of instruction sheets is not enough. Unless they improve upon or add to the value of other methods and devices, they may have certain disadvantages:

a. The instructor may rely too heavily upon them. He may develop the habit of merely handing them to the student without comment or benefit of other teaching methods. When students ask questions, he may make the error of continually referring them back to the instruction sheets. Distributing instruction sheets is not teaching.

b. Some students have difficulty understanding written directions, although they understand them perfectly when told verbally how to do the job.

c. Instruction sheets, if illustrated and well-printed, are difficult and expensive to produce in small quantities in or out of the school.

d. After sheets have been made up, there is a tendency to delay revisions — hence they may not be kept up to date. It is easier to change a teacher's notes and procedures than to reprint elaborate instruction sheets.

e. Difficulty may be encountered in keeping the sheets in order.

f. Some students have a tendency to read only part of the instructions before proceeding with the job or operation.

g. Students may pay little attention to the sheets after demonstrations are made or they may pay little attention to demonstrations if they know that they will get instruction sheets later.

3. Write instruction sheets only when the need arises.

Survey the field of your specialty for instruction sheets before attempting to write them. You may find available copies which may eliminate the necessity for writing your own sheets. The ideas presented in other sheets may be helpful if you decide to write your own.

4. Types of instruction sheets.

There are several kinds of instruction sheets that are recommended:

a. Operation sheets
b. Assignment and reference sheets
c. Job sheets

5. How to write operation sheets.

The operation sheet presents to the student the step-by-step manipulative instructions for performing an operation. It also contains the technical information needed for the performance of the oper-

ation. Each operation involved in a project can be represented by an operation sheet.

a. Select a specific title. A title should be descriptive. For example, "How to Drill Holes in Metal with a Hand Drill" is better than "Drilling Holes," because it specifically states the exact operation performed.

b. Each operation sheet should describe how only one operation is performed. The procedures should be listed in proper sequence.

c. Safety precautions should accompany any procedures which may be hazardous.

d. Illustrate the operation sheet with sketches or photographs wherever possible. It is better to show a section of a part rather than the entire part if detail and clarity will be lost in showing the whole.

6. How to write job sheets.

A job sheet is one which tells how to do a whole job or project. It can be built upon a series of operations necessary to carry on an activity or project to completion.

Job sheets can be used in two important ways:

a. When prepared by the instructor it may be used as a guide for students to follow in doing a job. This use of the job sheet does not contribute much to the development of the students' resourcefulness. Its main purpose is to point the way to do a job.

b. When prepared by the student it serves as a challenge to his ability to analyze the job and plan

his own procedure. This type of job sheet contributes directly to the development of self-reliance and resourcefulness of the student when carefully checked by the teacher before he proceeds with the job.

The following procedure is suggested in writing job sheets:

a. Select a specific title. A title should be descriptive; for example, "How to Make a Butt Weld" is better than "Welding," because it specifically states the exact job.

b. List the objectives of the job. An example fitting our title "How to Make a Butt Weld" would include:

1. To teach the proper procedures in making a butt weld using a rod
2. To provide practice in developing torch control and hand-and-eye co-ordination

c. List the average time requirement to do the job. This stresses the importance of the time element in any work and enables the student to compare his speed with others.

d. List the tools and equipment needed. In the project above, this list would include:

1. One complete oxy-acetylene welding outfit
2. One welding table
3. One pair of pliers

e. List the materials needed; for example:

1. One piece sheet steel SAE 1025, 1/16″ x 2″ x 6″
2. One piece sheet steel 1/8″ x 2″ x 6″
3. 1/16″ # 7 welding rod

4. 3/32" # 7 welding rod

f. List the steps in proper sequence for doing the job. The steps in making the butt weld would include:

1. Place two plates spaced full thickness of metal on a firebrick and tack 1" from each end and in center. Then place this assembly so it is in a 90° vertical position.
2. Start at bottom of seam and weld to top. The torch angle should be at 70° in relation to the work and the rod should be held at 90° in relation to the torch. (An illustration would appear here.)
3. Prevent the puddle from falling by moving the torch flame ahead and raised momentarily until the puddle solidifies. When the puddle is re-established, continue the weld for a short distance. Repeat until weld is completed.
4. Make evenly spaced ripples at 25° re-inforcement and 100° penetration at the top side.
5. Show no clear, defined edges at the bottom side of the completed weld as this indicates an incomplete penetration.
6. Do not burn the end of the weld by decreasing the angle of the torch so that most heat is deflected from the base metal and onto the rod.
7. Test the weld. Specimen should stand 180° bend test with no sign of failure at the root of the weld.

g. Illustrate the job sheet by sketches or photographs wherever possible. Many procedures can be explained more clearly by illustration than by word description. When illustrating, avoid the showing of unimportant details. "A picture is worth a thousand

words" only when the picture is a *teaching* picture, and proved to be worth a number of words.

7. How to write assignment and reference sheets.

The assignment sheet helps the student to gain further information about the lesson by directing his study or investigation. Questions are usually asked, and the student is required to seek the answers from the material suggested. It is an invaluable aid to self-study on the part of the student.

a. Select a specific title that adequately describes the assignment.

b. List the objectives of the assignment sheet. A statement of the purposes, principles to be taught, and application of the study should be included.

c. Give specific directions on exactly how the assignment is to be carried out.

d. Give any information not referred to in references.

e. If questions are to be asked, objective answers should be required. Objective questions permit ease of scoring, and have other advantages discussed in Chapter 7, "How to Make and Use Tests."

f. List the specific sources of information clearly.

g. State when the assignment is to be completed.

8. Make instruction sheets durable.

Instruction sheets must be made strong enough to withstand constant handling by many students.

9. Provide adequate filing facilities.

Instruction sheets must be filed so that they are easily accessible to students, and indexed in such a way that they can be found and replaced readily. The visible type of filing is recommended, in which the titles can be seen at all times.

10. Revise instruction sheets as needed.

It may be found that certain sections of individual sheets need revision to clarify meanings and statements of procedures. The proof of any instruction sheet is that it can be clearly understood by the student, and that it is technically correct. Changes in teaching techniques and advances in the technology of the subject will necessitate periodic revisions in instructional material.

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